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Paying the Bill for Western Leadership

IT is an unkind, and in many respects an undeserved, irony of fate that Mr. Khrushchev's momentous visit to the United States should coincide with the emergence into the open of the Administration's growing financial difficulties —the more so as Mr. Khrushchev is himself the symbol of two major causes of the Administration's present embarrassment — the cold war and the cost of military preparedness.

During the past decade (to go back no further !) the U.S. Government has been piling up a series of colossal budget deficits. In the aggregate, government spending has exceeded income during this period by over $35,000,000,000, culminating in a fantastic $12,000,000,000 deficit in the fiscal year ending last June. For the past two years the government has been seeking to fend off the inflationary consequences of this situation through the Federal Reserve Board's dear money policy, the maintenance of which undoubtedly intensified the recent American recession. The effect of this, coupled with the growing volume of Treasury borrowings, has been a rapidly mounting pressure on short term money rates to the point where the Treasury three month bill rate has advanced this week to 4.166 per cent, its highest since 1933. This is practically up to the 4¼ per cent statutory limit on the rate at which the government may borrow on long-dated bonds.

Congress, in the session just ended, refused the Administration's request to raise this limit, a decision which must very seriously hamper the Treasury in carrying out its long-term borrowing operations between now and the New Year in competition with the heavy requirements which may be expected to arise from industry once the steel strike is over, not to mention the demands from state governments and local authorities. Nevertheless, the government is faced with the stark necessity of borrowing about $78,000,000,000 over the next twelve months merely to replace maturing loans and in addition must raise a further $7,000,000,000 between now and the end of the year to finance current expenditure. In these circumstances the pressure on the short term market may well increase dramatically and even a 5 per cent short term money rate does not now seem inconceivable.

However, the hoisting of interest rates can be no more than a stop-gap solution and broadly there are only three ways out in the long run:

1. A further expansion of credit with its inevitable inflationary repercussions leading to a further weakening of the confidence in the dollar.
2. Higher taxes.
3. A cutback on public expenditure.

The solution of this dilemma is of acute concern not merely to the American taxpayer but to the Western world as a whole. The fact is that since World War II American public expenditure has, in effect, been the principal element in Western military defence as well as

in economic aid to those politically uncommitted areas of the world, which have been the centre of the cold war. America's civil and military foreign aid expenditure alone over the past decade accounts for more than the whole of her budget deficits over this period. Can America cut back appreciably on this expenditure without weakening her own position and that of the West in general *vis-a-vis* the Communist *bloc*, and if she does, what are likely to be the consequences in terms of added financial burdens for other countries in the Western alliance ?

If the Administration concludes that the maintenance of foreign aid and defence expenditure at present levels is the inescapable price of peace, her commodity support programme and strategic stockpile policies must come under increasingly close scrutiny.

Government stockpiling has come a long way from its original concept of a strictly strategic reserve to the point where it is nowadays the repository for metals acquired both directly from price support programmes and at second hand through barter deals. The value of metals and minerals in the strategic stockpile is reported to be over $7,000,000,000, of which some $3,000,000,000 is reported on present estimates to be in excess of purely strategic requirements. An official of the Office of Civil Defence and Mobilization stated, however, at the American Mining Congress this week, that a complete reappraisal was being undertaken of what strategic requirements would be following a nuclear attack and that no decision about surplus disposals would be taken for another year.

It was also stated somewhat ambiguously that the O.C.D.M. would resist " all efforts to use the stockpile as a means for influencing prices or otherwise interfering with the normal operations of the economy." In fact, of course, the only way that this can be done is by continuing to insulate government stockpiles from the market yet it is becoming increasingly apparent that surpluses to strategic stockpile requirements—whatever these eventually turn out to be—not to mention government stocks held outside the Defence Procurement Act, are now in America's present financial situation in much greater danger of being turned loose on world markets than ever before. Point is given to this danger by the Administration's reported intention to submit to Congress next year a plan to revise the stockpile laws so that surplus materials can be disposed of more easily and without the time lag which is now needed between the decision to sell and the obtaining of Congress approval.

At the risk of seeming unduly optimistic, and while recognizing that Washington will need to show greater wisdom in its destocking operations than we have witnessed during some of the frenzied stockpiling of past years, it is difficult to see how stockpile releases can be made other than so as to bring about a minimum of market dislocation.

In any choice between economizing by a given amount on foreign aid and realizing a corresponding amount from stockpile sales, the damage of the latter, if accompanied by a sharp fall in metal prices, to many of the primary producing countries also receiving foreign aid would be out of all proportion greater than a corresponding cutback in foreign aid itself. There *must*, therefore, be good reason to hope that government destocking, if and when initiated, will be in close consultation with major producers so that its effect may be seen first in the placing of a ceiling on sudden upward price movements and secondly in a slower rate of expansion in mineral output than would otherwise be needed to meet the rapidly expanding consumption requirements of the 1960's.

However one looks at the problem, the fact remains that America is now unavoidably faced with the choice between guns and butter. This is no new experience for us in Britain and we know it is one from which inflation can no longer offer any escape. For the West the issue has become one of the priorities, as it has always been in Russia. The Russian choice, imposed from the Kremlin, is to subordinate expenditure on living standards to military power at home and political infiltration abroad. Can we, on this side of the Iron Curtain, oppose these tactics without tightening our own belts too ? And if belts are to be tightened, shall it only be American belts ? This thought should be very much in the minds of Americans during this next fortnight. Is it too much to hope that it will be in our minds in Britain, too, if the coming election is indeed to be fought on foreign policy, as of course it ought, but if past experience is any guide will not be.

THE MINERAL INDUSTRY IN BRITISH BORNEO

The highlight of mineral production last year in Sarawak, Brunei and North Borneo was provided by the new bauxite industry in Sarawak, according to the latest report of Dr. F. W. Roe, director of Geological Survey for the three territories.

During 1958 the new industry of bauxite mining was launched successfully in Sarawak ; prospecting for chromite was begun in North Borneo ; and prospecting for some of the territories' other mineral resources was accelerated. The economic results of geological work in the territories are described as a " bright feature " of 1958. Indeed, mineral resources exported during the year were worth more than $M349,300,000 (£40,752,000) and continued to represent about 70 per cent of the value of exports shipped. Revenue yield to the three governments was $M100,775,000 (£11,757,000).

Describing the successful launching of Sarawak's bauxite industry, the report says that initial mining and shipping difficulties at the new mine at Sematan were soon overcome. Ore produced totalled more than 136,000 tons, of which 99,930 tons, worth about $M1,837,000 (£214,000), was exported.

Geological mapping continued during the year and two surveys were completed covering 7,100 sq. miles. Areas covering 35,500 sq. miles have now been explored and described.

CHILE—A LEADING IRON ORE EXPORTER OF THE FUTURE

With the announcement of a long-term iron ore exploitation programme by the Chilean company Compañia Minera Santa Fé, Chile has started on its way to becoming one of the world's leading exporters of this mineral. The Compañia has access to the ore reserves recently discovered on the El Laco plateau, where some 3,000,000,000 tonnes are estimated to be deposited 13,000 ft. above sea level. Plans for exploitation envisage a 10 to 15 year programme, and provide both for the working of the ore for export and the building of on-the-spot iron works with an annual production of 2,000,000 tonnes of pig iron.

The $300,000,000 necessary for the completion of these plans are the subject of financial consultations with financial groups in the United States and Europe. These consultations are now ending. The capital required will be more than covered over the period by the export of 24,000,000 tonnes of ore valued at $200,000,000 and 2,000,000 tonnes of pig iron worth $120,000,000. Ore exports will, as reported in *The Mining Journal Annual Review*, be to Bethlehem Steel in the United States.

Exploitation of the ore reserves is expected to start within five years at an initial annual output of from 10,000,000 to

15,000,000 tonnes. The main preparations for production are the laying of a fully mechanized transport system between the four exploitation centres of the El Laco reserves, a railway line between 215 and 250 miles in length from the reserves to the coast near Antofagasta, the building of a fully mechanized loading port on the coast with a loading capacity of 10,000 tonnes of ore per hour, the building of a power plant for the reserves site, the construction of the ironworks previously mentioned and the building up of a small fleet of ships with an as yet undecided total tonnage. Of particular interest is the plan to replace the prospective railway for part or even all of its distance from reserves to coast by a conveyor belt.

At present the Compañia is exporting growing amounts of ore from other sources. Last year some 1,874,000 tonnes were exported and by next year the annual total will have reached 4,500,000 tonnes.

ACTIVITIES OF AUSTRALIA'S BUREAU OF MINERAL RESOURCES

Geological and geophysical surveys in the search for oil and for metals are prominent in current activities of Australia's Bureau of Mineral Resources.

In the search for metals, a geological party of the Bureau is mapping in detail the copper field at Tennant Creek. Similar work is being done on the gold-bearing area of Misima Island, east of Samarai in the Territory of Papua-New Guinea.

Geological mapping to assist the search for metals is in progress in the Atherton area of north Queensland (in collaboration with the State Geological Survey), in the Mt. Drummond area north-west of Mt. Isa, and in the Urapunga-Roper River area of the Northern Territory.

Geophysical surveys for metals have already been completed near Mt. Lyell in Tasmania and at Ardlethan in New South Wales.

An airborne magnetic and radiometric survey of an area in Eyre Peninsula, South Australia, has also been carried out, to assist the search for metallic orebodies.

At the moment a similar airborne survey of the Norseman-Boorabbin area of Western Australia is in progress. A geophysical survey to follow-up an airborne survey, which was carried out in the Chillagoe area of North Queensland last year, has recently commenced.

Diamond drilling to assess the potentialities of the Maranboy tinfield in the Northern Territory is also in progress.

Specific investigations in the search for uranium are being made near Hall's Greek (W.A.), where a programme of detailed mapping has been undertaken by the Bureau in collaboration with the State Geological Survey. Airborne survey of this area will commence in the near future.

To aid similar investigations in the Mt. Isa region the Bureau's Auster Aircraft is engaged in a low-level radiometric survey which is now near completion. An intensive programme of diamond drilling has been commenced at the Adelaide River uranium mine, about twenty miles south-east of Rum Jungle.

Regional gravity surveys are in progress in eastern Australia. In remote inland areas gravity readings have been taken by an officer travelling on domestic airline services.

A regional magnetic survey is in progress in Western Australia and magnetic observations have also been made at Cocos Island, Christmas Island, Willis Island, Nauru and Ocean Island. By these observations the magnetic declination over wide areas may be accurately determined to assist navigation. These regional surveys are also designed to add to the fundamental data on which many techniques of geophysical exploration for oil and minerals are based.

The Bureau's vulcanological observatory at Rabaul, and geophysical observatories at Melbourne, Toolangi, Mundaring, Port Moresby and Darwin are in operation. The Bureau also has officers carrying out magnetic and seismological observatory work at Macquarie Island, Mawson and Wilkes by arrangement with the Australian National Antarctic Research expedition.

Resident geological staffs are engaged in investigations on behalf of the Administrators of Commonwealth territories from bases at Darwin, Alice Springs, Port Moresby, Wau and Rabaul. A Bureau geologist is also serving with A.N.A.R.E. at Mawson in Antarctica.

Miscellaneous activities now in hand include examinations of known phosphate deposits and a search for new deposits in Fiji and the Gilbert and Ellice Islands.

Geophysical investigations have recently been carried out in the Gippsland coalfield and the Blair Athol coalfield.

THE CHINESE COAL MINING INDUSTRY

It is stated in a report issued from Pekin this week that Communist China has now become the world's third greatest hard coal producer. The country's hard coal output amounted last year alone to 270,200,000 tonnes, or more than double the production of 130,700,000 tonnes for the previous year although, as the Chinese Government has in the past fortnight accused its planners of supplying false statistics for past industrial production, it might well be that these figures are rather exaggerated. Hard coal output for this year was to have been 380,000,000 tonnes, but this target had to be reduced to 335,000,000 tonnes owing to " faulty planning ". This total would, nevertheless, be an increase of 24 per cent on last year's output.

The true picture of the Chinese coal industry's development is further clouded, however, by a recent statement by the Minister for Coal Mining that in the first six months of 1959, coal production was as much as 90 per cent above the level reached in the first half of last year. In any case, the industry is reaching giant proportions ; it has overtaken the United Kingdom and now stands behind the Soviet Union and the United States only.

In the past year, as in all other branches of industry, a programme of decentralization has been carried out in the Chinese coal mining industry. The main point of the programme has been the reorganization of the small pits under local administration, the total number of which was planned to have been raised to some 100,000 during last year. These pits already account for a third of the total national coal output and in the first half of this year their combined production was intended to have been increased by 100 per cent on that for the same period of last year. Under a wide-scale programme, some 8,500 of these extra small pits are to be modernized and formed into small scale combines with an annual capacity of 200,000,000 tonnes of coal together with a large amount of iron and steel.

The other two-thirds of present production is won from large tonnage pits, most of which were equipped by the end of last year with hydraulic mining equipment. Some 120 hydraulic installations had been introduced by the end of the year and output increased accordingly. According to the Coal Mining Ministry, output from these pits was up by 60 per cent in the first half of this year. Most of the simple mining tools and equipment previously used have now been replaced by pneumatic units. A total of 200 new coal washing plants have been brought into operation.

AUSTRALIA AND ALUMINIUM—I

The World Aluminium Picture

This is the first of three extracts from a paper presented at a Symposium held in Brisbane on July 16 and 17, 1959 by the Australasian Institute of Mining and Metallurgy, Southern Queensland Branch, the Australian Institute of Metals, Brisbane Branch, and the Royal Australian Chemical Institute, Queensland Branch

By
Dr. J. A. DUNN

THIS survey is concerned with the period extending to 1975—that distant date is chosen simply because it has been fashionable in such surveys ever since the Paley Report appeared in 1952. Short-term accelerations or decelerations to development may take place, which may appear to upset predictions, but for a commodity developing at such a rate as aluminium, an allowance of up to five years either way at the end of a period of the length of that contemplated here, does not affect the general conclusions.

Consumption

Between 1950 and 1958 Free World consumption of primary aluminium rose from 1,318,000 tons to 2,430,000 tons—including Communist countries the world total rose from 1,560,000 tons to 3,020,000 tons. The year of peak consumption was 1956, when the Free World total was 2,654,000 tons and the world total 3,170,000 tons; the recession in the United States in 1957-58 led to some reduction in consumption there, although consumption elsewhere was maintained. Present indications are that world consumption during 1959 has recovered and will be above the 1956 peak.

The world total primary metal consumption is supplemented by old scrap brought back into circulation. However, published annual figures of aluminium recovered from scrap lead to inflated figures of consumption, for they include large amounts of new scrap which, from the point of view of end products, in effect represent an annual duplication of new metal consumed. After the war, large amounts of old scrap were available in Europe, and the ratio of this to total metal consumed was high, probably up to 30 per cent initially—the ratio has since fallen considerably. In the United States, total secondary metal including new scrap consumed in 1957 and 1958 respectively is quoted at 321,150 tons and 330,400 tons of which only 64,000 tons and 79,500 tons were old scrap—4.4 per cent and 5.6 per cent of total metal consumption (primary metal plus old scrap), an average of 5 per cent over the two years.

Whilst overall consumption is rapidly increasing, there is little prospect that the ratio of old scrap to total consumption will greatly increase, although, of course, the actual quantity of old scrap will increase as part of the greater usage of the past few years and of the years ahead is turned into scrap. At this stage it would be difficult to guess the ratio at which old scrap to total consumption will stabilize in the distant future. For the period of rapid expansion with which we are concerned now, to 1975, it is difficult to see from where old scrap is to come to sustain a ratio much higher than 5 per cent.

But, if a large-scale new usage were to develop within the next five years, of a type which gave a near 100 per cent scrap turnover, then the ratio of old scrap would be much higher by 1975. It has been said that, if aluminium were universally used in automobile engines, wheels, radiators and bumper bars, some 2,000,000 tons may well be added to Free World total aluminium consumption—a large potential reservoir of old scrap. A pointer to such future usage is the commencement of production of a small-car aluminium engine at the Chevrolet plant at Tonawanda, U.S.A. in May this year. Most of the larger automobile companies are pursuing investigations to a similar end.

During recent years the main quantitative increase of usage has been in extruded shapes, in plate, sheet and strip, and in diecasting. Industrially the major consumer was the building industry, which absorbed about 28 per cent of the total. Transportation possibly represented about 23 per cent, the electrical industry around 15 per cent, consumer durables about 16 per cent and containers and packaging 10 per cent.

Growth of aluminium consumption in the future depends, of course, on three trends—growth of existing usages, substitution of aluminium for other materials, and new usages (in reality mainly a matter of substitution, particularly of steel). Substitution will be dependent in part on price. In relation to the base metals, copper and zinc, I doubt whether aluminium will be in a better competitive price position over the next 10 years. Thereafter it may move ahead. The main quantitative increase in aluminium usage will be in the field of transportation and building construction, where it will take the place of much steel and non-metallics and perhaps find some new usages. The scope in building construction particularly has scarcely been touched outside of the United States.

We must appreciate that the usage development for aluminium is in a very different position from that for the base metals, or for steel. These, over the course of the years, have come to depend mainly on the more or less natural growth of long-standing usages, losing ground in some cases to other materials. Aluminium is vigorously pushing its way into new fields and, for the present, its annual increment of growth may be expected to surpass that of the older basic commodities—eventually, as its scope for further conquest narrows it, too, will slow down to the rate of growth of the long-standing commodities into which it enters at that time and will also meet with the competition of substitutes.

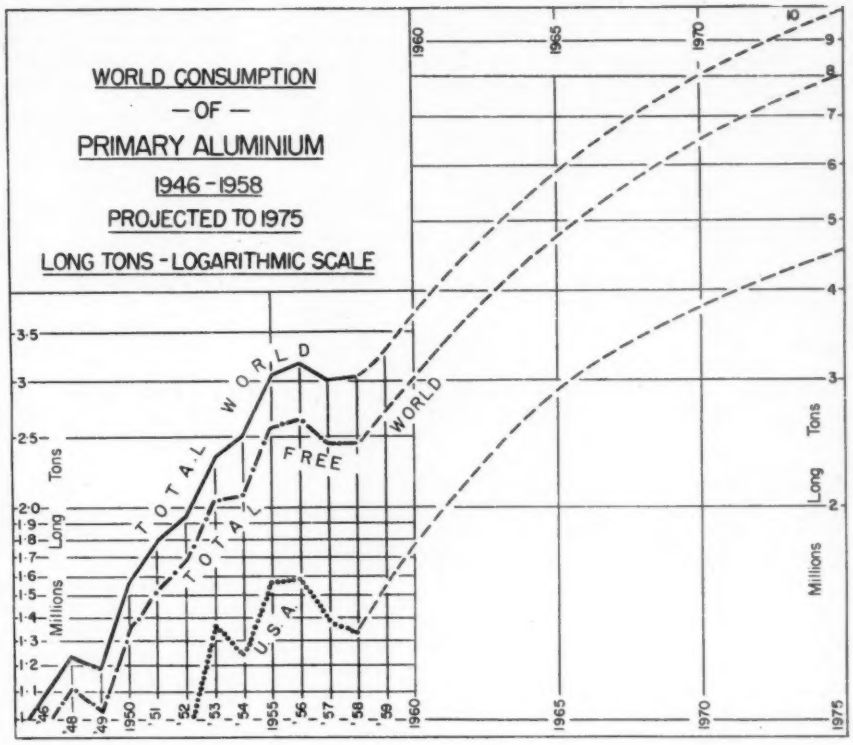
Excluding the peak year 1956, in the eight years between 1950 and 1958 the total world consumption of aluminium (primary metal and old scrap) rose from about 1,650,000 tons to around 3,250,000 tons, an average increase of 200,000 tons per year, or about 190,000 tons of primary metal. For the Free World only the respective figures would be about 150,000 tons and 142,500 tons. Of course, had the six years to the peak year 1956 been taken, the rate of increase would have been considerably higher. But the fall in consumption during 1957 and 1958 in the United States was a natural slackening off following satiation in the previous years. We may expect such periodic checks also in the future.

To what extent is this rate of increase likely to be representative of the years ahead? In examining some of the estimates of future consumption that have been made, we meet the difficulty that each is on a different basis. It is not

always clear whether an estimate refers to manufacturers' intake, which will include primary metal, old scrap and new scrap, or to real consumption which will be primary metal and old scrap, or to primary metal only.

For the Free World, the Paley Report of 1952 visualized an average rate of increase over the 25-year period of 230,000 s.tons (207,000 l.tons), or 182,000 s.tons (162,000 l.tons) of primary metal.

Having in mind that we have passed only one-third of the 25-year period, and that in the later years a rather higher annual increase may be expected, the Paley Report estimates of total metal would seem to be reasonably well substantiated by the consumption increase to date. The Report may have overestimated the scrap ratio, as it implies that the equivalent of about two-thirds of the metal consumed this year will return as scrap in 16 years. Quantitatively, the amount might be reached if extensive use of aluminium in automobiles became general in the next four or five years.



The E.C.E. Economic Survey of Europe in 1957, on the basis of certain hypotheses related to the rise of Gross National Product and on somewhat theoretical assumptions, estimated that consumption of aluminium in Western Europe would increase by 1975 to 120-200 per cent above the 1955 consumption. The Paley Report scale of estimates would be within these limits.

Future Consumption

In 1957, Mr. Felix Wormser, formerly assistant secretary to the U.S. Department of the Interior, estimated that by 1975 the world aluminium usage would be two to three times the present level—a scale of increase comparable with that of the Paley Report estimates.

Mr. Bert Inch, vice-president of Kaiser Aluminium and Chemical Corporation, in April this year forecast that U.S. aluminium consumption (primary and old and new scrap) in 1965 would be 3,750,000 tons, about double the present total. This seems to work out at an average increment of 270,000 tons of primary metal annually to 1965.

Mr. Walter L. Rice, president of Reynold's Mining Corporation, has also recently discussed the trend of future U.S. consumption. Based on a study of more than 80 major applications of aluminium in more than 20 major U.S. industries, he estimates that by 1975 the annual usage in the United States will approach 10,000,000 s.tons (8,900,000 l.tons), or five times present usage. This estimate includes both old and new scrap. In terms of primary metal and old scrap presumably the estimate may be taken as 7,250,000 l.tons in 1975.

The rate of aluminium growth in the rest of the Free World, particularly in Europe, has been even greater in the past eight years than in the United States, and in the next 16 years may be expected to maintain or even improve on that relative position. The total Free World consumption, on an extrapolation of Mr. Rice's figures would rise by 1975 to at least 12,500,000 tons ; of this maybe 625,000 tons would be old scrap. On this basis, the average annual increment to 1975 would be 550,000 tons primary metal—but in the later years of the period, to bring up the average the annual increment would need to rise to the order of 1,000,000 tons. I would regard these higher estimates cautiously, appreciating also that aluminium developments in other countries will take some of the increase away from U.S. manufacturers.

Some two years ago I wrote : " The years 1950-1956 covered a period of general high-level industrial activity and expansion. During this period other metals were not in over-ample supply and prices of them were high for considerable periods ; aluminium thus had a favourable field for competition, in addition to its widening scope in many new usages for which its particular properties are eminently suitable. As the backlog of demand became satisfied, increased usage fell behind increased production ; this difference will be adjusted in 1957 not only by reducing production below capacity but also by absorption of a certain amount of aluminium in the U.S. stockpile. With zinc and copper now back to and below more normal prices, aluminium will meet with stronger competition for certain purposes ".

New Markets

Those qualifications remain. At that time I estimated that, under certain circumstances, Free World consumption by 1970 would be 4,750,000-5,500,000 tons (new metal). Extrapolating on a percentage basis, consumption of new metal by 1975 would be 7,000,000 to 8,000,000 tons (with scrap, a total of up to 8,500,000 tons, slightly above the Paley Report total).

The qualification was also made that " Such figures would be greatly increased should aluminium replace another metal in some very large scale usage—for example, if a uminium

were to take the place of steel for motor engine blocks as has been envisaged". The probability that usage in automobiles may add 2,000,000 tons to consumption has been mentioned earlier—but such a usage, with virtually 100 per cent scrap recovery, is not a continuing booster of primary metal production, for it becomes almost self-sustaining once scrap begins to return after a period of say 10 years.

Some day, resistance to the expansion of aluminium into new markets will slow down its growth to a rate comparable to that of the older metals. We cannot anticipate now when that will be—future relative prices of the individual materials concerned will be of importance. If I were to hazard a guess, it will be by the 1970's; it may well be earlier having in mind that research in other materials will not be backward. There are signs even now that in some usages the aluminium rate of growth has been slowed down.

Of course, all this is only playing about with figures relating to the hazy future. Interesting though they may be, they merely suggest that, sometime in the late 1970's, aluminium requirements of primary aluminium in the Free World may range between 7,000,000 and 10,000,000 tons, and perhaps over. Including Communist countries, the total may range from 10,000,000 to over 13,000,000 tons primary metal.

Arsenic Production in Canada

By J. S. ROSS

Industrial Minerals Division, Department of Mines and Technical Surveys, Ottawa

REFINED arsenic trioxide, arsenious oxide or white arsenic, commonly more than 99 per cent pure, is a white powder produced from arsenical ores. It is the basic compound from which other arsenic compounds and arsenic metal are produced. During 1958, arsenic trioxide was the only form of arsenic sold by the Canadian producer. To prevent air and stream pollution, the commodity is recovered as a by-product from gases given off during the roasting of arsenical metallic ores. Normally recovery far exceeds demand, with the result that much of the output has to be carefully disposed of because of its toxic effects.

In an article appearing in *Canadian Mineral Industry*, Review 28, the author points out that refined arsenic trioxide has been produced in Canada almost continuously since records were first kept in 1885. As in recent years, Deloro Smelting and Refining Co. Ltd., at Deloro, Ontario, is the sole producer. The shipments of 1958 were 37 per cent less in quantity than those of 1957. Exports, down 47 per cent from 1957, represented 76 per cent of production. All exports went to the United States; none was sent, as in other years, to the United Kingdom as well. Canada is self-sufficient in arsenic trioxide. Imports of arsenical compounds increased nearly 2 per cent in quantity.

World recovery of the commodity amounted to an estimated 47,000 s. tons in 1957, Sweden being the leading producer. Canadian recovery is approximately one tenth that of Sweden. Canada will be self-sufficient in arsenic trioxide for the foreseeable future.

Domestic Production

Deloro Smelting and Refining Co. Ltd. recovers refined arsenic trioxide as a by-product from the smelting of silver-cobalt custom concentrates from the Cobalt and Gowganda areas of northern Ontario. Arsenic occurs in these concentrates as arsenides and sulpharsenides of cobalt, iron and nickel. Plant output varies with the arsenic content of the custom ores. This content was relatively low during 1958 because of the tendency of the mines to produce silver concentrates rather than cobalt concentrates. When output exceeds demand, the surplus arsenic trioxide can be stored indefinitely in the sealed metal drums in which it is sold. During 1957 and 1958, however, shipments of refined white arsenic were greater than its actual recovery.

Bralorne Mines Limited in British Columbia ships arsenical gold concentrates to a smelter at Tacoma, Washington, for refining. No payment is received for the arsenic content, nor is it accounted for in export figures.

Giant Yellowknife Gold Mines Limited and the Con and Rycon mines at Yellowknife, Northwest Territories, roast arsenical ores to improve gold recovery. The crude arsenic trioxide recovered at the Giant Yellowknife mine is disposed of underground in specially prepared rooms, whereas that from the Con and Rycon mines is disposed of in a dump. A FluoSolids roaster and a baghouse for crude arsenic trioxide collection were installed at the Giant mine during the year, thereby replacing the older roasters and increasing roaster capacity.

The crude variety is also recovered and disposed of at the Red Lake, Ontario, gold mines of Campbell Red Lake Mines Limited, Cochenour Willans Gold Mines, Limited, and new Dickenson Mines Limited. Arsenical residues from the treatment of uranium ores by Eldorado Mining and Refining (1944) Limited at Port Hope, Ontario, are disposed of in insoluble form in a dump. Minor amounts of arsenic are present in many other metalliferous deposits in Canada.

Consumption and Uses

Arsenic compounds produced from white arsenic are used throughout the world, mainly for their toxic effects in herbicides, insecticides, rodenticides and other pesticides. Calcium and lead arsenates are the compounds commonly used in these products. The consumption of arsenic as an insecticide in the United States varies with the boll-weevil menace in the southern states. In recent years organic and inorganic compounds have generally replaced calcium and lead arsenate in controlling insects, rodents and weeds. Pests, however, become immune to these new compounds, and it is necessary to use the compounds in rotation with a different type of poison. Thus, the use of arsenic for this purpose may not disappear altogether.

The glass industry, the world's third largest consumer of arsenic trioxide, uses it in the decolourizing and fining of glass. This industry accounted for 73 per cent of the arsenic trioxide consumed in Canada in 1957. White arsenic is consumed in the manufacture of copper- and lead-base alloys and arsenic compounds.

Arsenic compounds are used in wood-preserving, hide-tanning and the manufacture of paint pigments. The newer method of killing and debarking trees with sodium arsenate is becoming more widespread. This method reduces peeling, drying and the cost of transporting the pulpwood.

The world outlook for arsenic consumption will remain relatively unchanged.

Bulgaria's Expanding Coal Production

THE pre-war coal output of Bulgaria was around 3,000,000 tonnes per year. Since the Liberation, 15 years ago, it has been stepped up to close to 13,000,000 tonnes a year. In 1957, when the current 3rd Five-Year Plan was drafted, provision was made for a further increase of 62 per cent, to 19,215,000 tonnes, by 1962. From the rate at which progress was being made, however, it became evident that this target was too modest, so in March this year it was superseded by one of 25,000,000 tonnes, representing an increase of close on 100 per cent in five years. It has since been decided that the third Five-Year Plan can, and should, be fulfilled in 3-4 years, and the rate of expansion of coal production has accordingly been advanced still further.

As the result of this last decision, it has also become necessary for drastic steps to be taken to speed up the expansion of electric power supply. On July 15, therefore, it was decreed that Bulgaria's output of electric power must reach between 6,000,000,000 and 7,000,000,000 kWh by 1962, instead of the planned 3,000,000,000 kWh so as to reach 10,000,000,000 to 12,000,000,000 kWh by 1965. Since the hydro-electrical potentialities of Bulgaria are limited and are subject to climatic conditions, this increase is to be achieved by the development of thermal power stations. This will be done by speeding up the exploitation, by opencast mining, of the vast reserve of brown coal in the Maritsa-Istok coalfield near Stara Zagora. The illustration depicts opencast mining by rotary excavator on this field.

This coalfield, in which lies the greater part of Bulgaria's reserves of brown coal, estimated at 3,500,000,000 tonnes, was already scheduled to be producing 10,300,000 tonnes annually by 1962, or about as much as all the collieries in Bulgaria were producing in 1956. A briquetting plant working on a process which has been developed in the German Democratic Republic, also forms part of the programme, the briquettes having a calorific value of 3,800 calories per kilogramme, or almost that of the best hard coal. Output was scheduled for an ultimate rate of 1,800,000 tonnes a year, reaching 1,200,000 tonnes by the end of 1962. These briquettes were to be the basis of electric power production in Bulgaria, being used directly on the site in a 300,000-kWh power station known as Maritsa-Istok and then transported to other power stations all over the country. Since the extensive application of mechanization and a considerable measure of automation will make it possible to mine this brown coal at a cost some 2½ times less than at Bulgaria's other main opencast mines, Bolshevik and Alexandr Milenov, the advantage will be qualitative, even more markedly than quantitative.

It is understandable, therefore, why the present decree calls for a general acceleration of the development of the whole Maritsa-Istok complex, which includes also a fertilizer factory with an annual capacity of 440,000 tonnes. All the ministries concerned, all state and public bodies, and all industrial enterprises are expressly instructed to give the highest priority to anything relating to the speedier completion of the Maritsa-Istok complex, and a "Plenipotentiary of the Government" — an engineer named Ivan Benzarov has been appointed "to direct, co-ordinate, and secure the planning, construction and fitting-out work, and to see that the necessary materials, plant and machinery are made available".

The following timetable has been drawn up :

1. At the Maritsa-Istok power station, the first group of turbines, with a power of 50 megawatts, and boiler aggregates Nos. 1 and 2 are to be in operation by the 3rd quarter of 1960 ; the second group of turbines with a power of 50 megawatts, and boiler aggregate No. 3, by the 4th quarter of 1960 ; and boiler aggregate No. 4, by the 1st quarter of 1961.
2. At Troyanovo I Mine, the first stage of construction is to be completed by the end of 1959, so that 670,000 tonnes of coal will be produced in 1960.
3. At Troyanovo II Mine, preparatory work is to begin during the 4th quarter of 1959, so that construction can be put in hand during 1960.

South Africa's New Search for Gold

The past two years have seen a marked acceleration in the tempo of gold prospecting operations. In this article our South African correspondent describes the reasons for this new burst of activity, and points to the differences between this and earlier periods of intensive exploration.

LOOKING at the history of the South African gold mining industry, it is noticeable that just when existing fields were beginning to show signs of old age, new major discoveries were made. This could be ascribed to good fortune, and certainly luck is an essential tool in a successful prospector's kit. It is more accurate, however, to regard this phenomenon as part of the inevitable dynamic of the industry—as mines reach maturity, the balance sheets of the houses, which are largely dependent on dividends for their income, become more and more liquid. Prospecting provides an outlet, and the attaining of a dividend-paying stage by the new mines coincides with the decline of the old producers.

The present burst of activity stems largely from the revival of interest in gold shares. The latest statistics issued by the Johannesburg Stock Exchange show that, compared with June 30, 1958, the total market value of O.F.S. mining shares was up by 69 per cent ; that of Far West Rand counters up by 29 per cent ; and that of financial stocks up by 38 per cent.

Time for Prospecting

This, naturally, has caused much happiness among investors, but probably more important in the long run is that it has allowed the mining houses to build up strong cash positions through sales of shares from their portfolios. The lucky aspect is that this situation came about just at the stage when virtually all the post-war mines were getting in their full stride, which also meant that, in terms of the logical development of the industry, the time was ripe for a full scale search for new deposits.

This is now well under way, and it is estimated that prospecting rights and options over mineral rights held by the major houses extend over more than 5,000,000 acres of ground in the Transvaal and Orange Free State. The accompanying map shows the main areas where work is now going on or is to be undertaken.

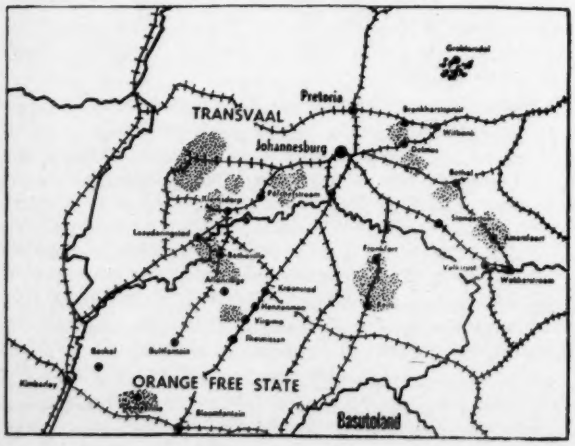
It is interesting to note that 50 years ago a company called the Columbus Syndicate started a gold search based on the theory that the most likely places for economic depositions of gold were along the edges of granite intrusions. The idea was not given much credence in those days and the company faded out of existence. Nevertheless, this concept is playing a major part in the present exploratory programme. What brought about a revival of the idea was the work in the Free State, which was summed up by Dr. B. B. Brock in an article in *Optima*, March 1954.

It is interesting to record that, also 50 years ago, a geologist, whose name is not known, propounded the theory of a basin similar but smaller than the Witwatersrand existing to the Far East in the Kinross-Bethal area.

Quite a lot of the work being undertaken is where some previous investigations had been done with no significant results. The reasons for the second look are the result of increased geological knowledge built up over the years through improved exploratory techniques, particularly in the field of drilling. It is considered that it is quite possible not only that earlier boreholes have failed to obtain anything like complete core recoveries, but also that reefs were missed as their existence was never suspected. The Vaal Reef was a typical example of the latter, as it was not spotted in the original drilling for the deeper Kimberley-Elsburg series in the Klerksdorp district.

The present gold search will be as different from the O.F.S. one of the 1940's as it was from the original gold rushes of the 1880's. Apart from participations by one or two small companies, the options and rights are in the hands of the big groups. They have stepped in and acquired these over large areas of country, so that there is no question of bargaining with individual option dealers for possibly small key pieces of ground. In the boom days of the Free State, much of the area was the option dealers' paradise and many individual and small groups did well out of bargaining with the groups. Others did well by floating of companies for share market purposes — many of them having the sole asset of " Free State " in their title.

The shaded areas on this map, prepared by the South African Information Service, indicate approximately where the main prospecting is being undertaken



New Style of Gold Rush

This time there are going to be no small companies and no announcement of borehole results as they intersect reef. The pattern will be patient investigation with complete security and then, when the time is ripe, the announcement that application has been made for a mining lease in a certain area. The exact location of the new property and its size will wait upon the granting of the lease. This system is operating today, as can be seen in the lack of public knowledge of the details of Union Corporation's Bracken and Leslie mines in the Kinross area.

It is difficult to find out which houses are engaged in prospecting various areas except by piecing together cryptic announcements in annual reports and listening to the regional news services on the radio, which often produce items to the effect that a mining house has taken up options over Mr. X's farm in such a district. But it does look as if all the houses are in on this next phase of exploration.

Machinery and Equipment

An Electrostatic Particle Separator

Research scientists of General Mills Inc., in the United States—after a decade of intensive studies — recently developed and patented a highly versatile electrostatic particle separator, claimed to be of an entirely new type. The "E-Machine", as it is called, may find special uses in the mining, mineral, metal and a score of other industries. The equipment is seen below.

The electrostatic principle has been applied in separation processes for many years. The new unit, developed at the company's Minneapolis Central Research Laboratories, however, presents a refinement in combining process and apparatus features in heightened precision.

Mr. L. F. Borchardt and Mr. W. A. Brastad of the company's Central Research Laboratories have been closely identified with the development of the new machine and process. Mr. Borchardt, director of the company's Physical Research, reports that the new machine "indicates good potential as a tool in some ore separation processes". Mr. Brastad, leader of the Laboratories' Applied Physics Section, has taken particles of titanium minerals from sand and silica. In a typical demonstration, the machine efficiently isolated metallic aluminium from aluminium oxide particles.

Sand consists for the most part of tiny loose grains—1/12 in. to 1/400 in. in dia.—crumbled or worn away from solid rock. As a rule the contents are mainly silica but there may also be pure grains of many valuable minerals. The "E-Machine" has extracted particles of wolframite, ilmenite, rutile, and zircon from sand. Grains of radioactive ores such as thorium may be there for the taking — if the taking can be made efficient and economical. It is considered that, where minerals occur as sand, or where it is feasible to grind them into discreet particles with valuable properties, the unit merits testing.

The "E-Machine" differs from earlier machines in a number of principles. For example, it uses prolonged rather than brief exposure of particles to charging, in combination with emphasis on induced rather than frictional charges. It also involves selection of optimum conditions of vibration, and prompt removal of adequately charged particles.

Earlier machines were designed for the easier job of separating good electrical conductors from poor conductors. Gross electrical differences permitted brief exposure to charging, such as feeding on to a rotating roll electrode. Some products to be separated, however, differed so slightly from each other in electrical properties that it was found necessary to feed them along an extended metal deck where each particle is given ample time to acquire its characteristic charge.

In the "E-Machine", particles are vibrated along a metal deck while the electric field is applied by a high tension metal plate above. Through the attraction of the charged plate above, charges flow on to the particle from the lower deck on which it rests. The high voltage is adjusted until enough charges are drawn (or induced) on to the particles to lift some particles along with the charges toward the upper metal plate. This is provided with holes through which the rising particles may shoot. Turned up rims or collars around these holes prevent the particles from going down again once they light on the top side of the upper electrode.

The remainder of the particles, the residue, also receives induced charges, but of magnitudes generally insufficient to lift them, and thus they feed out along the lower deck on which they started.

Feeding of both the original mixture on the lower deck and the lifted particles on the upper electrode may be accomplished by the same vibration. Inclined mounting springs cause the apparatus to move upward at the same time that it moves forward. Conversely, downward and backward motions occur simultaneously. This specialized vibration causes the particles to be propelled along the deck by repeated pushes.

Some lifted particles may miss the hole in the upper electrode and strike the underside of the metal surface. These particles will lose some of their charge and return to the lower deck for recharging and a second chance to be lifted out.

Because the particles must be fed in thin layers to afford each of them a chance for charging and possible removal, increased capacity is achieved by adding deck area. Commercial sized machines have decks 2 ft. or 3 ft. wide and as much as 6 ft. long. The decks are stacked one above the otner and vibrated in unison.

A single-deck model of the General Mills "E-Machine", utilizing electrostatic principles and mechanical design features in unique combination, performs precision test in laboratory

LARGE RUSSIAN CONTRACT

It is of marked interest that F. Taylor and Sons (Manchester) Ltd., in conjunction with Climax Rock Drill and Engineering Ltd., have been awarded the recent Russian contract for mining equipment worth well over £250,000. Both companies have played a significant role in the development of this type of equipment in Great Britain.

The Russian order calls for four mobile, telescopic tower scaling carriages and 15 mobile drilling machines, each mounted with four Holman SL 280 drifter drills. This equipment which, the Russians say, "will be used for drilling very hard rock faces", represents the latest design in mobile mining plant and is the result of many years' research and development.

The machines for the Russian contract are an adaptation of the Taylor-Hurd electric mining drill design, and they have special features. The operating platform is carried on a double telescoping tower which is raised by two hydraulic rams from 6 ft. to a maximum of 19 ft. 6 in. from ground level, while the machines weigh about 15 tons each and are mounted on crawler tracks. They are powered by electricity which is supplied through a trailing cable.

Four hydraulically operated booms are attached to the drilling platform, each carrying a Holman SL 280 drifter of 3½ in. bore and having a feed length of 13 ft. The four booms may be raised or lowered, slewed and rotated either indi-

vidually or simultaneously. All movements are operated from the elevated platform and it will be possible to drill rock faces up to 32 ft. in height.

The four roof-scaling carriages, which will also be used for roof bolting, are mounted on identical chassis to the mobile drills. Extending to a height of 82 ft. 3 in., the platform will carry men and equipment up to a maximum weight of half a ton. It is mounted on a telescopic tower comprised of five nesting sections which, when collapsed and folded, will have an overall height of only 10 ft. 10 in. Wire ropes are used to elevate and lower the platform, and limit switches will prevent raising of the tower unless the machine is on an almost level surface. Four stabilizing legs will prevent any tendency for the tubular steel tower to overbalance.

Delivery of the first machines is scheduled for April, 1960.

SUPPORTED SILICONE RUBBER INSULATION

A new, supported silicone insulation system claimed to be three times as strong as unsupported silicone rubber is a feature of U.S. General Electric's completely redesigned line of a.c. motors, available for export. Development of the insulation system, trademarked as Polyseal by U.S. General Electric, is an advance in combining the superior dielectric and sealing properties of silicone rubber with a greatly improved mechanical strength.

Because of the Polyseal insulation, the random and formwound motors, ranging from one to 5,000 h.p., will now be used in many installations previously limited to totally enclosed and more costly motors, a factor of great significance to the mining and metal-working industries.

Other features of the new G.E. line of a.c. motors include average reduction in size of 25 per cent, the first use of prewound cores on G.E. motors rated above 125 h.p., the introduction of a new bearing system, and improved ease of maintenance.

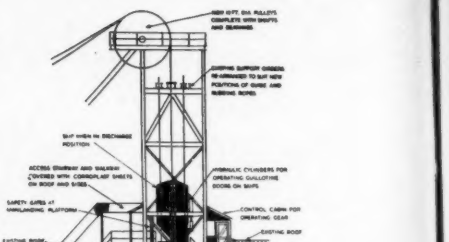
SUPPORTS FOR MINE TUNNELS

A new approach to the problem of providing permanent arch supports in mine tunnels where major distortion is unlikely has been made by Causeway Reinforcements Ltd., a company which specializes in steel fabrications for industrial plants. A careful study of the theoretical problems in conjunction with the practical experiences of mining engineers and mining economists has led to the introduction of two types of arch support which, it is clamed, can reduce installation and maintenance costs, and provide protection against the effects of minor distortion.

One type of Causeway support is a development of the company's Hexmetal cellular reinforcement. The feature of the construction is its honeycomb pattern in which the strips are linked with patented independent pin joints. The employment of independent pins makes for resistance to corrosion since the pins, being unstressed, are less prone to corrosion than integral lugs. For rigid structures the honeycomb strips may be riveted or welded.

The second type of Causeway support is made up of several 2½ in. deep $\frac{5}{16}$ in. thick steel flat girder bars, spaced at any specified interval across the mesh; the standard pattern having girder bars at intervals of 12 in. Above and below these bars are laid mats of 3 in. square electrically welded mesh of 6 s.w.g. mild steel wire. Mesh and bars are secured and locked with 16 s.w.g. clips on either side of each bar. These permit the bars to be clamped to give a rigid frame. The four girder bars have a cross-sectional area equal to that of a 3 in. x. 3 in. R.S.J. The wire mesh extends a further 4½ in. at either side of the end girders giving a total width for the standard fabrication of 3 ft. 9 in.

Both types provide a continuous protection against roof and side wall falls, and unlike spaced girders, require no additional space lagging. Where Causeway arches are installed, the resistance to airflow for ventilation is greatly minimized, an indeed with the addition of a thin skin of concrete, a practically frictionless tunnel wall is provided. Causeway Reinforcement Ltd., is a member of the Amber Group of Companies.



Above, at right, is a sketch of the skip plant for the Winsford salt mine. Below, at left, a diagrammatic impression of the Taylor-Hurd mobile telescopic tower scaling carriages

SALT MINE MODERNIZATION

Britain's only working salt mine at Winsford is to be modernized by installing skip plant supplied by Head Wrightson Stockton Forge Ltd., a subsidary of Head Wrightson and Co. Ltd. The order, which covers the underground handling and storage equipment also, has been placed with the company by the I.C.I. Salt Division and the new plant will enable production to be considerably increased.

The rock salt is mined from a depth of approximately 500 ft., the strata being 80 ft. thick, of which 20 ft. is extracted by the pillar and stall method.

To overcome design difficulties, the skips will be constructed entirely in aluminium alloy and will have a payload capacity of 2.3 tons. The skips will be bottom discharge type operated externally by hydraulic rams and fitted with a hinged deck to accommodate men when necessary.

An unusual feature incorporated on the measuring pockets is the use of electronic load rings for accurate weight assessment and the whole of the plant will be electro-hydraulically controlled. This modern control system greatly reduces the number of operatives required.

NEW PORTABLE SLUDGE PUMP

A new portable ejector-type self-priming sludge pump has been developed by Holman Brothers Ltd. The pump is designed for working at low heads and is capable of handling very dirty, contaminated and gritty water containing a high percentage of solids.

The new pump operated by compressed air at 80 p.s.i. provides a maximum delivery of 43 g.p.m. with a 10 ft. head of water and is capable of operating with heads up to 50 ft. to provide 35 g.p.m. It is eminently suitable for such duties as removing drill sludge from headings.

The pump is of light weight construction, and comprises essentially a main tank and top and bottom cover assemblies. In operation it is controlled by a float within the main tank which actuates an air valve in the top cover. The valve opens and closes as the liquid rises and falls within the tank. Cylindrical in shape, the pump is 24 in. high, 12¼ in. dia. and weighs 78 lb.

MINING MISCELLANY

A party of 15 geologists and mining engineers from 12 Asian countries are visiting the U.S. and Canada on a three months' tour to study geological and mining methods and equipment used in the development of mineral resources in these countries. The party includes Dr. H. J. C. Kirk of the Geological Survey Department in Kuching; Mr. S. K. Chung, a geologist in the Geological Survey headquarters, Federation of Malaya; and Inche Ahmad Azizuddin bin Haji Abidin, an Inspector of Mines stationed in Ipoh, Perak. The tour is under the auspices of the U.N. Economic Council for Asia and the Far East and the U.N. Bureau of Technical Operations in New York.

★

The British Borneo Geological Report for 1958, states that during the year bauxite mining was started in West Sarawak, and a London mining company commenced chromite prospecting in North Borneo. Importance is attached to the discovery of granite at Bukit Pinang, which will greatly help road development in stone-short central Sarawak. Several million cu. yds. of accessible gravel and cobble beds were found in Brunei. The report also states that during 1958 the Shell Companies of Borneo spent $M.9,160,000 on abortive exploration for oil.

★

A further new source of potash for the Soviet Union (*vide The Mining Journal*, August 28, 1959, p. 190), is to be the recently discovered nepheline deposits in Uzhursk. Processing plants, which will come into production in 1965 with a capacity of 44,000-55,000 tonnes annually, are to be built in Siberia to produce this potash as a by-product of non-ferrous metallurgy in the form of potassium sulphate from the Uzhursk nephelines. Siberia's future demand for potash, when a projected large-scale fertilizer industry has been established, is estimated at as much as 567,000 tonnes a year.

★

An agreement has been reached between the regional administrations of Jogjakarta and West Java, Indonesia, on a joint venture for exploiting manganese ore in both areas. Consideration has also been given to setting up a corporation for manganese exploitation throughout the country and to the construction of a processing plant costing $12,000,000 in order to improve the quality of the ore for export. Under this scheme, the plant will be jointly directed by representatives of manganese-producing areas. Indonesian manganese ore has been exported to West Germany and Japan.

★

The National Economic Council of the Philippines decided on August 20 to withhold barter privileges for the time being from a number of products named in the new barter law, R.A. No. 2261. Barter privileges were not considered for coal, due to the small known deposits now available in the Philippines. As regards quicksilver, there is only one producer in the Philippines and technical studies would show that the product could profitably be sold for dollars. Similarly, technical studies show that the output of refractory chromite can readily be sold abroad, particularly to the U.S. The Philippine Republic supplies about 80 per cent of the U.S. requirements for this mineral.

★

In its annual report for 1958, the Billeton Tin Co. states that in Tanganyika the Mbeya Exploration Co. completed preliminary investigations into the mining of pyrochlore. Large reserves were found and concentrates were being sent to Holland for grading. The best results indicated that mining on an economic basis was possible and very considerable investments would be required.

★

Consolidated Morrison Explorations has acquired control of a high-grade potash property near Saskatoon, Saskachewan. The agreement gives the company 61,000 acres on which three drill holes have been completed. These holes gave an average thickness of 7.8 ft. and an average grade of 28.8 per cent potash. The property adjoins the mine owned by the Potash Co. of America.

★

Marble quarrying in the Federation of Malaya may be revived, if a suggestion recently made by an official of the Department of Mines is allowed up. Marble was extensively quarried before the last war, but all present-day requirements in both Singapore and the Federation are imported, mainly from Italy. Increased building activities have created a considerable market for this stone. The suggestion was made that Pulau Langkawi, an island of the north-west coast of Malaya, should be prospected.

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The Alcoa Exploration Company in the Dominican Republic is spending an additional $521,000 on workers' houses and further improving facilities for bauxite extraction in the Cabo Rojo area. In the first six months of the year, 143,833 tons have been shipped to Point Comfort, Texas, for processing. Alcoa staff has been increased from 273 to 342 workers. It is stated that if the demand for aluminium in the United States increases, the production figure for the Dominican Republic deposits will be correspondingly increased.

★

More than 47,000 West German coal miners have demonstrated in the Ruhr against announcements that more mines in the region are to be closed during the next two years.

★

Brown coal production in Poland during the first half of this year was, at 4,500,000 tonnes, 104.8 per cent of the planned output for the period. The 49,150,000 tonnes of hard coal produced broke the target limit with 103.1 per cent.

★

Plans for the establishment of a joint Cypriot-Israeli copper refinery in Haifa to process copper pyrites imported from Cyprus are now being finalized. Recent reports from Tel Aviv state that a new company, the Israel Ore Processing Co. has been formed with a total investment estimated at I.£4,000,000. The Israeli Government is reported to have approved the plan, and to have agreed to lend the new company I.£1,500,000. Equipment for the plant would be bought from the United Kingdom and West Germany. Should the plan materialize, production would commence in January, 1961, with an initial 30,000 tons a year. Nearly half of the output would be for export to Eurpoe. In addition to the output of refined copper, the plant would produce sulphuric acid.

★

West Germany's first uranium mine will go into production next month. The mine, near Ellweiler in the Rhineland Palatinate, is expected eventually to produce one ton of uranium ore a month.

★

During the first half of this year, shipments of iron and manganese ores from Goa totalled 1,400,000 tons and 31,320 tons repectively. Japan was the largest buyer of iron ore (813,060 tons) followed by Western Germany.

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Venezuela has no reserved zones for the exploration for, and exploitation of, nickel as is the case of other ores. The first concession was granted to Cia. Meridional de Minas, S.A., a subsidiary of the International Nickel Co. of Canada, in 1946, but production did not start until November, 1955. According to a survey conducted by Inco, the existing reserves at the Loma de Hierro alone can be estimated at 30,000,000 tons. Production in 1958 totalled some 2,000 tonnes, as compared to only 508 tonnes in 1956, the first full year of exploitation.

★

In Bihar State, India, 21 seams of coal with a total reserve of 188,000,000 tons have been located in South Karanpura coalfield by the Geological Survey of India. Three of the seams are stated to be of considerable thickness, capable of yielding about 12,000,000 tons of coal.

★

A 15-man team of geologists began a survey of ore deposits in British Guiana on September 9. Main interest will be directed towards manganese deposits, with considerable attention being given also to diamonds.

★

Mr. G. P. Sinha, Parliamentary Secretary to the Indian Minister of Steel, Mines and Fuel, has announced that preliminary discusions have taken place with Polish authorities regarding their general offer of assistance in the development of copper mining in India.

★

An aerial survey of a 150 square miles area around the St. Patrick's Copper Mine at Avoca, Co. Wicklow, will begin late this month. This is the first move in a three-year exploration programme by a Canadian mining group, the South-East Ireland Syndicate. The group comprises Consolidated Mogul Mines, owners of St. Patrick's Copper Mine, and six other Canadian mining companies, and it has been granted sole exploration rights for the area by the Irish Government.

★

The Czech foreign trade corporation METALIMEX has been commissioned by the Czech State Bank to act as sole importer in the country of precious metals. The corporation intends to start the purchase of precious metals, particularly gold and silver, direct from producer countries in the near future. Address of the coporation is 34 Stepanska, Prague 2.

NEWS FROM BRAZIL

Companhia Niquel Tocantins is being organized to produce zinc from the calamine ores of the Vazante deposit, Minas Gerais, of which the reserves are estimated at 5,000,000 tons. The ore will be concentrated at the mine to facilitate transportation to the company's plant. The latter will comprise metallic furnace equipment, with complementary installations to extract zinc, which will be transferred to a smaller furnace in the form of oxide of zinc clinkers, with 80 per cent Zn. The clinkers will be reduced by electrolysis to produce metallic zinc. Initial production at the rate of 18,000 tons annually is planned to start in 1961, electric power being obtained from the Tres Marias hydro-electric station.

★

Companhia Electro-Quimica S.A. (Elquisa) has completed the first stage of its expansion programme, raising annual production of aluminium to 8,800 tons and is now increasing to 15,000. Companhia Brasileira de Aluminio, Sorocaba, has exceeded its 1958 target of 10,000 tons and the two companies plan to raise combined output to 67,500 tons in 1968. Local consumption is estimated at 46,000 annually at present.

★

Asberit S.A., Rio de Janeiro, has invested 140,000,000 cruzeiros in a factory to produce amianthus yarn.

PERSONAL

Mr. W. V. D. Skrine has been appointed a Director of Ayer Hitam Tin Dredging Ltd.

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Sir Arthur Fadden, G.C.M.C., P.C., a Queenslander and former Federal Treasurer, has become Australian head of an international concern interested in the development of iron ore deposits in Queensland. He is now negotiating on its behalf for an option on an area of 100 acres of a headland in the vicinity of Mourilyan Harbour, North Queensland, estimated to contain 130,000,000 tons of iron ore with some silver and gold. The State Government has for some years been trying to bring about the establishment of a steelworks in Queensland, using the coking coals at Bowen, some 250 miles south of Mourilyan.

★

Mr. J. E. C. Purnell has been appointed executive director of MATBRO Ltd.

★

Mr. H. H. McGregor, managing director of Production-Engineering (South Africa) (Pty.) Ltd., has been appointed chairman of Mining Services (P.E.) Ltd. At the same time, Mr. J. P. Martin-Bates, a managing director of P. E. Holdings Ltd., has joined the board, the other members of which are Mr. J. N. Stephens, managing director of P. E. Management Group (Australia) Pty. Ltd., Mr. G. Keith Allen, Reader in Mining at the Royal School of Mines, Mr. R. A. Scott and Mr. R. D. Power.

★

The Development Branch of the Development and Research Department of The Mond Nickel Co. Ltd., has recently been reorganized into four divisions under the general managership of Mr. F. Dickinson. Mr. L. W. Johnson, assistant manager of the department, retires at the end of the month.

★

We regret to record the death, on September 6, 1959, of Mr. John Henry Cumpsty, until recently a director of Blackwell's Metallurgical Works Ltd., in Liverpool. He had been associated with the company for over 60 years.

★

Mr. Sidney Norman Bourne has retired after 47 years of service with the British Thomson-Houston Co. Developments with which he has been particularly associated include the high tension flame proof contactor gear with single bolt cover fixing.

★

Following the appointment of Mr. R. W. Kneeshaw as Managing Director of Atlas Copco (N.Z.) Ltd., the New Zealand company of the world-wide Atlas Copco group, Mr. K. G. C. Nicholls has been appointed manager of the Walsall branch of Atlas Copco (G.B.) Ltd., in his place.

CONFERENCES AND EXHIBITIONS

The First International Congress on Metallic Corrosion will be held in South Kensington, London, during the week April 10-15, 1961, under the presidency of Sir Harry Melville. Mr. E. Leslie Streatfield has been appointed chairman of the executive committee and Dr. J. Ferguson, chairman of the finance committee. The honorary secretary is Lieut.-Col. Francis J. Griffin, 14 Belgrave Square, London, S.W.1.

★

The next production exhibition, the fourth in the series, will be held in the National Hall, Olympia, London, from April 25 to 30, 1960.

COMPANY NEWS

A four day exhibition illustrating the properties and uses of nickel and its alloys is to be staged by Henry Wiggin and Co. Ltd., at The Midland Hotel, Peter Street, Manchester, from October 12-15.

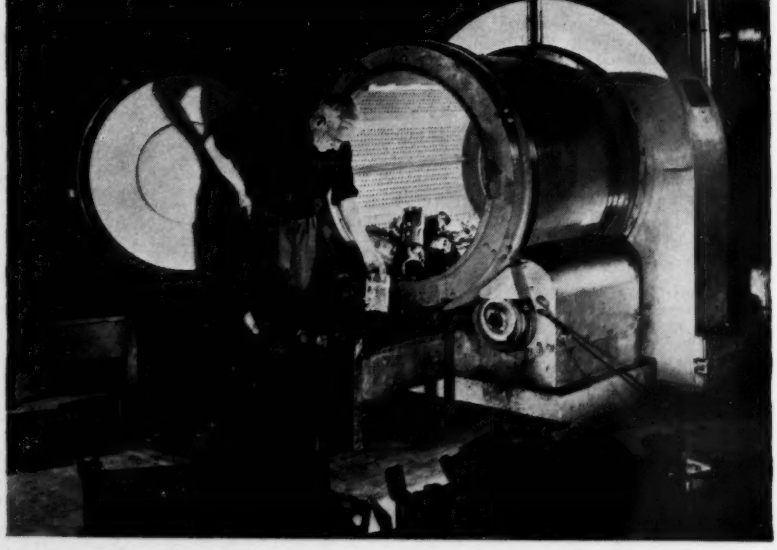
★

On Monday, September 21, Ferodo Ltd., will open new premises at 3 Condercum Road, Newcastle-on-Tyne, 4, Telephone Nos. Newcastle-on-Tyne 39131/2. These premises replace the accommodation in Barras Buildings which the company has occupied in the city for the past 24 years.

★

A new works at Horley has been acquired for the production of the Matbro range of fork lift trucks and loading shovels. As from September 14, 1959, all production, sales, and service of the Matbro range will be carried out from there. A new company, Matbro Ltd., will be responsible for this side of the business, the new address and title being, Matbro Limited, Matbro Works, Horley, Surrey. Tel. Horley 4441 (5 lines). Telegrams and Cablegrams: Matbro, Horley, Surrey.

At the headquarters of the Holman Group in Camborne, Cornwall, a new Metallurgical Control and Heat Treatment Department has been built and equipped to help meet ever-growing demands for mining machines with increased power and reduced weight. The department, with a floor area of 17,000 sq. ft., contains metallurgical, physical and chemical laboratories and high speed, tool steel, piston and general heat treatment sections. The rotary shot blast machine shown below cleans rock drill components prior to further processing



CONTRACTS AND TENDERS

Taiwan (Formosa)

Mine ventilation equipment for coal mine. Air capacity from 50,000 to 100,000 c.f.m. Mine hoist motor 300 h.p. Electric motor and accessories, six 100 kVA. transformers, four rock drilling machines piston 2½ in. in dia. Issuing authority Central Trust of China, Purchasing Department, 68 Yen Ping Nan Road, Taipei. Closing date October 8, 1959. Ref. E.S.B./21457/59/I.C.A. Telephone Chancery 4411, extension 354.

Ceylon

Complete core drilling accessories. Issuing authority, The Chairman, Tender Board, Ministry of Transport and Power, P.O. Box 547, Transworks House, Colombo. Closing date, October 28, 1959. Ref. E.S.B./20966/59/I.C.A. Telephone Chancery 4411, extension 354.

Metals and Minerals

Washington Mining Lobby Keeps on the Job

Before Congress went into recess early this week, two Bills were approved by the Senate calling for the establishment of a national minerals policy for the United States. In case this news should sound a little odd to some of us outside the U.S. who envy the facilities for long-range planning provided by the U.S. Bureau of Mines, it should be explained that the call for a national minerals policy is only a euphemism for more protection for the domestic mining industry.

One of these two Bills has already passed through the lower house and now awaits Presidential approval. It calls for Administrative action to protect domestic mineral production by quota or tariff and also would require the Administration to review existing minerals programmes so as to provide greater production and employment in the depressed mining areas — mainly in the Western States.

Although the Bill apparently makes no reference to stockpile policy it does not require much imagination to visualize the domestic political pressures which must be building up against the Administration's implied intention to embark on destocking operations next year to which we refer in this week's lead note.

WOLFRAM PRICE RISE TAPERS OFF

Since our last report, the London quotation for wolfram has risen only fractionally further and is now quoted at 162s. 6d. to 167s. 6d. per unit c.i.f. Europe. There has also been a cessation of the heavy trading of the past few weeks. It looks as if buyers are holding off for the moment to test the strength of present prices, which in the circumstances is hardly surprising.

NICARO NICKEL PLANT FOR SALE

The U.S. Government-owned Nicaro nickel plant in Cuba is up for sale. The G.S.A. announces that it is open to receive offers up to December 1. The plant, which represents an investment of about $85,000,000, has been operated by the G.S.A. since it was reopened in 1952. Earlier reports this year have suggested that the plant would have a capacity of 27,000 s.tons by 1961. There is nothing in the announcement to suggest whether tenders will be considered from non-U.S. operators, but in any event with the actual and prospective surplus nickel capacity which exists at the moment, the Nicaro plant can scarcely be regarded as an attractive short-term investment.

In this context interest attaches to the Freeport Nickel announcement that its Moa Bay nickel-cobalt project will shortly be operational while the refinery at Port Nickel, Louisiana, which has been put up to handle the concentrates from Moa Bay is expected to be able to begin production of nickel and cobalt both in briquetted and powder form about six weeks after Moa Bay is in full operation. Annual refinery capacity will be 25,000 s.tons of nickel and 2,200 s.tons of cobalt.

U.S. QUICKSILVER CONSUMPTION SHARPLY UP

U.S. consumption of quicksilver in the second quarter of this year is reported at 18,300 flasks, a 54 per cent increase over the 11,900 flasks total during the first quarter of the year. According to the U.S. Bureau of Mines this is the highest total for any quarter since the beginning of 1955 and is attributed in part to the installation of a new chlorine and caustic soda plant in Texas. Substantial increases in offtake by the pharmaceutical and electrical apparatus industries are also reported. Mine output and imports were also up in the second quarter at 8,080 and 9,841 flasks respectively compared with 7,870 and 7,818 flasks in the first quarter.

U.S. URANIUM PRODUCTION RISING

U.S. production of uranium ore during the first half of this year totalled 3,310,000 s.tons against 2,807,000 tons in the second six months of 1958. At the same time ore stockpiles at the processing mills had declined at the end of June last to 1,451,635 s.tons against 1,956,531 s.tons a year ago. Ore reserves in the U.S. at mid-year were estimated at 88,900,000 s.tons, an increase of some 6,500,000 tons since the end of 1958.

BERYLLIUM IN NOVA SCOTIA

According to the Nova Scotia Mines Department workable deposits of beryllium ores have been discovered in more than a dozen places between Mahoney and Shelburne on the south shore of the province. According to the Deputy Minister of Mines, the discoveries are suffiiciently interesting to justify exploration by private capital.

THE VOLTA RIVER PROJECT

The exploratory talks between the Ghana Government and the Kaiser Aluminum and Chemical Corporation reported in this column on July 17, have now reached the stage where Kaiser Aluminum has agreed to take the initiative in forming a consortium of aluminium companies to finance the proposed smelter near Tema. The establishment of an aluminium smelter is an essential element in the feasibility of the Volta River project, and if Dr. Nkrumah can obtain a definite commitment from the aluminium producers, this will make his problem of fund raising for the dam and hydro electric projects very much easier.

Alcan and British Aluminium who already have substantial bauxite interests in Ghana are obvious prospects for the proposed consortium, but Kaiser Aluminum is also understood to have had some preliminary discussions with French and Italian interests. The proposed smelter is to have an eventual annual capacity of 220,000 tons with 120,000 tons as a first stage target. The Ghana Government hopes to receive a specific proposal from Kaiser before the end of the year.

RISE IN CHILEAN COPPER OUTPUT

One reason why domestic U.S. copper producers may be facing the present copper strike (which has already cost them about 100,000 tons of production) with some equanimity may be found in recent statistics in Chile which show that output from the big Chilean operations for the first eight months of the year are about 75,000 tons ahead of the corresponding period ending 1958. At this rate Chilean output this year may exceed 550,000 l.tons—always assuming that the looming strike at El Teniente is averted.

WILL NEW TIN QUOTAS BE MET?

In the context of the sharp increase in the fourth quarter tin quotas, A. Strauss and Co. in their latest monthly review of the tin market raise the interesting speculation of whether Bolivia, Indonesia and Thailand can all be counted on to deliver their full quotas. We would not have thought that in the case of Thailand, where the increase in any case is less than 500 tons, there is likely to be any difficulty, but in the case of the extra 1,000 tons which must come both from Bolivia and Indonesia, uncertainty as to the fulfilment of the quota may well be a market factor later in the year.

Both countries were producing at about 1,000 tons above their new quota rate in the year immediately proceeding the introduction of quotas. However, observers question whether the technical efficiency of the industry in Bolivia, which had already been in decline for some years previously, may have slipped further under the enervating influence of restriction while the reduced effectiveness of central government in Indonesia renders any prediction for that country uncertain.

LEAD/ZINC CORRECTION IN "ANNUAL REVIEW"

In the 1959 edition of our *Annual Review* the charts showing the movement of L.M.E. and American prices for prompt lead and zinc (pages 15 and 17) unfortunately got transposed. We trust that readers will have already noticed this and avoided being confused by an error which we much regret.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

The firmer undertone to the copper market reported in our last article soon faded away and prices have steadily declined, the underlying weakness of the market being again underlined on Monday when in the afternoon the price suddenly fell to as low as £222 per ton for cash metal and then recovering almost all the ground lost in the same market. Tin and zinc remain steady with the former showing a tendency towards higher prices. The lead market remains featureless.

COPPER PRICE DOWN DESPITE TIGHT SUPPLY PROSPECT

The behaviour of the copper market, where prices have declined and the backwardation has been replaced by a contango, is still very difficult to explain in face of the continuation of the strike in the U.S. which has already cost some 100,000 tons of production.

It is true an attempt has been made by a small group of workers at Butte to recommence work on the basis of the old contract pending a general agreement throughout the industry, but negotiations have apparently broken down and it is generally felt that Anaconda will not agree to any such move. Apart from this, there are no signs of any getting together and it is generally believed that the strike will now extend well into October. Should this prove to be the case, it is hard to see how the London market can continue its downward trend.

Negotiations between the Braden Copper Co. and the unions are continuing. At the time of writing representatives of both sides should have appeared before a conciliatory board and it is generally expected that a new contract will be signed to replace that expiring on September 30.

The establishment of the contango in London has taken place in spite of shipments to America and the probability that the longshoremen's strike will be postponed beyond the end of this month. The official warehouse figures at the end of last week showed a reduction of only 300 tons, giving a total of 14,663 tons, but it is pointed out that it is during the present week that the majority of metal is being shipped away.

The Copper Institute's figures for August can be considered satisfactory in view of the considerable increase of deliveries in countries outside the U.S. Inside the U.S., production of crude copper dropped from 89,985 in July to 57,206, whilst the production of refined copper dropped from 134,020 to 79,860. Deliveries to consumers fell from 108,127 to 89,123, whilst stocks of refined copper in producers' hands fell from 103,432 to 92,175. Outside the U.S., the picture is reversed with production of crude copper rising from 175,067 to 180,556; production of refined copper rising from 140,732 to 141,877; deliveries to consumers rose from 123,011 to 148,121 and stocks fell from 286,122 to 282,344.

BUFFER STOCK MANAGER AGAIN A SELLER

The tin market has shown little reaction to the increase in export quotas and if anything, with demand showing a better tendency both in the U.S. and in Europe, the tendency can be quoted as being very firm and it is believed that the Buffer Stock Manager has had to sell metal during the past week to maintain the present price. Stocks in official warehouses showed an increase of 708 tons at the end of last week and this has helped to establish a small contango.

On Thursday the Eastern price was equivalent to £817½ per ton c.i.f. Europe.

RECENT LEAD-ZINC STATISTICS

The lead market continues to have a weak undertone in spite of fairly good business and the pressure of supplies has kept the contango at between 20s. and 30s. per ton. Production in America is still seriously affected by the strike but with the present quota period almost at an end, this has no effect upon the outside world, and as it is believed that sufficient stocks are now awaiting entry into the U.S., the commencement of a new quota period will also pass almost unnoticed.

In O.E.E.C. countries the production of lead in July totalled 49,686 tonnes which showed a slight rise over the June figure but is some 12 per cent higher than in June, 1958. In America the July production, as given by the Bureau of Mines, amounted to 19,200 s.tons which is some 11 per cent below the monthly average for the first six months of the year.

The zinc market continues on its steady course with demand being maintained and availability of metal being not too good.

In July the O.E.E.C. countries produced 69,587 tonnes which was slightly below the June figure but exceeded that of a year ago by about 2 per cent. In America, in spite of the steel strike which existed throughout the month, domestic shipments of zinc in August fell only slightly. Production was 69,768 tons against 73,101 tons in July, whilst domestic shipments were 58,918 tons against 59,460 tons. Stocks at the end of the month, however, increased by about 10,000 tons.

Closing prices are as follows:

	Sept. 10 *Buyers*	*Sellers*	Sept. 17 *Buyers*	*Sellers*
COPPER				
Cash	£232¼	£232½	£226¾	£227
Three months	£232	£232½	£228	£228½
Settlement	£232½		£227	
Week's turnover	8,100 tons		12,125 tons	
LEAD				
Current ½ month	£71⅜	£71⅝	£70⅞	£71⅛
Three months	£72⅜	£72½	£72⅛	£72¼
Week's turnover	6,150 tons		6,725 tons	
TIN				
Cash	£793	£793½	£793	£793½
Three months	£792	£792½	£793½	£794½
Settlement	£793½		£793½	
Week's turnover	520 tons		795 tons	
ZINC				
Current ½ month	£86¼	£86½	£86	£86⅛
Three months	£85½	£85¾	£85	£85⅛
Week's turnover	4,675 tons		4,450 tons	

LONDON METAL AND ORE PRICES, SEPT. 17, 1959

METAL PRICES

Aluminium, 99.5%. £180 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £190 per ton
Crude (70%) £190 per ton
Ore (60%) bases 19s. 6d./20s. 6d. nom. per unit, c.i.f.

Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 9s. 0d. lb.
Cerium (99%) net, £16 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 14s. lb.
Germanium 99.99%, Ge. kilo lots 2s. 5d. per gram
Gold, 250s 6½d
Iridium, £23/£25 oz. nom.
Lanthanum (98/99%) 15s. per gram.
Manganese Metal (96% - 98%) £245/£250
Magnesium, 2s. 3d. lb.
Nickel, 99.5% (home trade) £600 per ton
Osmium. £21/£23 oz. nom.
Osmiridium, nom.
Palladium, £6 10s./£7 10s.
Platinum U.K. and Empire Refined £28 10s. oz
Imported £26½/£27½
Quicksilver, £71½/£72 ex-warehouse
Rhodium, £41/£45 oz
Ruthenium. £18/£20 oz. nom.
Selenium, 50s. 0d. per lb.
Silver, 79d. f. oz. spot and 78½d. f'd
Tellurium, 18s. lb.

ORES AND OXIDES

Bismuth			30% 5s. 0d. lb. c.i.f. 20% 3s. 3d. lb. c.i.f.
Chrome Ore—			
Rhodesian Metallurgical (semifriable) 48%	(Ratio 3 : 1)		£15 15s. 0d. per ton c.i.f.
" Hard Lumpy 45%	(Ratio 3 : 1)		£15 10s. 0d. per ton c.i.f.
" Refractory 40%			£11 0s. 0d. per ton c.i.f.
" Smalls 44%	(Ratio 3 : 1)		£14 0s. 0d. per ton c.i.f.
Baluchistan 48%	(Ratio 3 : 1)		£11 15s. 0d. per ton f.o.b.
Columbite, 65% combined oxides, high grade			nom.
Fluorspar—			
Acid Grade, Flotated Material			£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF_2)			156s. 0d. ex works
Lithium Ore—			
Petalite min. 3½% Li_2O			40s. 0d./45s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O			40s. 0d./45s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O			£25 0s. per ton f.o.b. Beira
Magnesite, ground calcined			£28 0s./£30 0s. d/d
Magnesite Raw (ground)			£21 0s./£23 0s. d/d
Manganese Ore Indian—			
Europe (46% - 48%) basis 57s. 6d. freight			nom.
Manganese Ore (43% - 45%)			nom.
Manganese Ore (38% - 40%)			nom.
Molybdenite (85%) basis			8s. 11d. per lb. (f.o.b.)
Titanium Ore—			
Rutile 95/97% TiO_2 (prompt delivery)			£29/£30 per ton c.i.f. Aust'n.
Ilmenite 52/54% TiO_2			£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)			162s. 6d./167s. 6d. per unit c.i.f.
Vanadium—			
Fused oxide 95% V_2O_5			8s./8s. 11d. per lb. V_2O_5 c.i.f.
Zircon Sand (Australian) 65 - 66% ZrO_2)			£16/£17 ton c.i.f.

Mining Finance

Bumper O.F.S. Dividend Season

Rapidly improving throughputs at the O.F.S. gold mines this year helped to create an optimistic climate for the autumn dividend season which opened last week. When the payments were announced, however, even the optimists were confounded both by the number and degree of the increases recorded. The latest payments, together with the preceding three, are summarized below.

	Mar. 1958	*Sept.* 1958	*Mar.* 1959	*Sept.* 1959
	s. d.	s. d.	s. d.	s. d.
Anglo American Group				
F. S. Geduld ..	2 0	3 0	3 6	4 6
P. Brand ..	2 6	2 6	2 6	3 0
P. Steyn ..	1 3	1 3	1 3	1 3
W. Holdings ..	3 0	4 0	3 6	5 0
Welkom ..	3	3	3	3
Union Corporation Group				
St. Helena ..	1 0	1 1	1 3	1 9
Central Mining Group				
Harmony ..	1 0	1 0	1 1½	1 3

The most outstanding improvement was recorded by President Brand, where a repeated distribution of 2s. 6d. had been taken for granted. Indeed, at last January's meeting the chairman, Mr. S. Spiro, gave no indication of any increase, rather implying that the aim would be to maintain the payment at 5s. per annum until the full benefits of the expansion scheme began to be felt in about 1962. Bearing in mind the fact that distributable income in the 1958-59 financial year will almost certainly be less than that in 1957-58, the market's surprise was understandable.

The factor which tipped the scales in favour of an increase may well have been this year's notable improvement in the native labour situation. Although this is common to all mines, the effect has been more marked at Brand by the fortuitous occurrence of certain technical factors which have permitted the release for immediately productive work of part of the labour force previously employed in forward development underground. This has resulted in throughput reaching 120,000 tons monthly (compared with the chairman's forecast of "approximately 100,000 tons"), while waste sorting has been intensified sufficiently to maintain a grade of over 16 dwt. in the second half of the financial year. (Another result of the redeployment of labour, incidentally, will be that the ore reserves to be published next month may appear disappointing. Although at least as much ore as usual will have been developed during the year, a proportion will not appear in reserve figures because the necessary raise connections are being left undeveloped until the ore is needed.)

St. Helena was another mine whose dividend will have caused satisfaction, but in this case, as readers of the *M.J. Quarterly Review* will know, the surprise widely expressed was without justification. On the other hand, it would be wrong to look for a further increase of more than 3d. next quarter. Elsewhere, the Western Holdings and F. S. Geduld payments were above most recent expectations, and Harmony's was as expected. Of all the dividend-paying O.F.S. mines, only President Steyn and Welkom have not managed to bring their 1959 totals above last year's levels.

LONDON MARKET HIGHLIGHTS

Once again, London contributed little business to the South African Gold share market this week. Such features as there were nearly all stemmed from Cape demand coupled with a sprinkling of U.S. buying. St. Helena, for instance, were consistently bid for at the Cape at prices shillings higher than the London quotation. The shares reached 87s. 3d. here and were reportedly 90s. bid in Johannesburg where there were high hopes that the September quarterly report will disclose further good gold development values. Similar factors were at work behind the rise in West Driefontein to 172s. 6d. The shares of most other mines did little more than move a few pence either way, even the unexpected increases in some of the Anglo American group O.F.S. dividends making little difference to quotations.

Most interest in the Finance section centred on Consolidated Gold Fields. Steady buying of the shares was encouraged by the success of the recently made bids for New Union and H. E. Proprietary. By Wednesday night Gold Fields had risen 4s. 3d. on the week to 84s. 3d. and on that same night came news that the company was embarking on a new exploration programme. Options have been acquired over 60,000 morgen (200 square miles) lying to the south of the Far West Rand mines on the West Wits line. Drilling operations are to start shortly to find out whether the reefs running through Doornfontein, Blyvoor, West Driefontein and Western Deep Levels reach into the new area at mineable depths.

Another finance house share to move ahead was "Johnnies" (69s. 3d.), the move being accompanied by expectations that details of financing arrangements for the new Western Areas flotation will be announced soon now that the new company has been registered in Johannesburg with a capital of £8,700,000. "Freddies", which has a 20 per cent stake in the new project, moved up to 11s. 7½d. Other firm spots included Anglo American (10⅛) and "Writs" which steadily rose on investment buying to a new high record of 65s. 3d.

In the Diamond group De Beers, after moving ahead on the increased interim, later succumbed (at 175s.) to the setback on Wall Street. "Casts", however, continued to find buyers attracted by the high yield offered on the shares and rose to 22s. 9d. A revival in Platinum shares was attributed to expectations that a resumption of dividends by the Rustenburg group would take place in the next few weeks. Potgietersrust improved to 8s. 7½d.

The Copper share market seemed bewildered by the gyrations in the metal price and the uncertainty of Wall Street. Little selling developed, however, and prices showed few movements of note. Nchanga (61s. 10½d.) were duly quoted ex- the three-for-one scrip issue but the resulting more manageable share price failed to attract much attention. "Tanks" (45s. 3d.) and Kentan (39s. 4½d.) at one time made a modest response to comment on the good prospects this year for their income from Union Miniere investment.

Tronoh (17s.) provided a firm spot in an otherwise neglected Tin group. Elsewhere, Murchison at 52s. 6d. continued to reflect Cape expectations of good antimony sales in the current quarter.

BILLITON : AN "EVENTFUL" YEAR

The Billiton Company's description of 1958 as "very eventful" would appear to be an understatement of almost British proportions. Indeed, the fact that the parent company, N. V. Billiton Maatschappij, was able to prevent its profit falling below 3,200,000 guilders (against 5,700,000) reflects great credit on the management.

The political situation in Indonesia remained Billiton's greatest difficulty. In particular the Indonesian authorities withdrew without warning their co-operation in the joint venture Billiton Mining Co. This entailed the automatic liquidation of the company, and virtually the whole of the staff was repatriated. At the same time, the "economic war" waged by Indonesia on Dutch interests resulted in a sharp reduction in ore arrivals at Billiton's Arnhem smelter, with still more retrenchment problems. The two remaining Billiton affiliates in Indonesia, Sitem (tin) and Nibem (bauxite) were placed "under management", an expression which, says Billiton, is anything but clear. Clear or not, the Dutch management and staff were dismissed.

Outside Indonesia, the Billiton interests met with fewer obstacles. Kamatavi Tin (S. Rhodesia) was unable to achieve satisfactory results because of the unstable tin market, but the ore reserve has been considerably extended. Exploration in Tanganyika by the Mbeya company was continued with some success. Large deposits of pyrochlore were found, and a pilot plant which includes an aerofall mill has been erected and is in production.

DE BEERS RAISE INTERIM

The news that De Beers was raising its interim from 4s. to 5s. was another reason for satisfaction in the mining markets this week. Although the most common comment, not surprisingly, was "at last". De Beers' distribution has been stabilized at 10s. per annum for eight years, during which time earnings have virtually doubled. In the same period the share price has risen from about 55s. to its present level of about 176s.

A large proportion of De Beers' profit retentions has, of course, been used to expand the non-diamond side of the company's activities, and latterly the gold

portfolio in particular has proved a most worth-while investment.

It is true, too, that as the keystone of a somewhat sensitive industry, De Beers must maintain a balance sheet of more than average strength. Nevertheless, the trend towards buying "on earnings" has not yet gone so far that investors are no longer interested in dividends.

GOLD CERTIFICATES FOR GERMANY?

Samuel Montagu and Company, the London bankers and bullion merchants, are reported to be negotiating with the Deutsche Bank of Frankfurt with a view to the introduction of gold certificates in the Federal Republic.

South Africa, too, is planning a certificate scheme to complement the sales of actual gold to private investors introduced last May. By the end of August total sales under this latter scheme had reached £7,850,000. The principal backers of the South African certificate plan are Mr. Charles Engelhard (through Engelhard Industries) and the Banque de l'Indochine (through its subsidiary the French Bank of Southern Africa).

It is thought that the details of the proposed schemes will follow the lines of that introduced earlier this year by Samuel Montagu in co-operation with the Bank of Nova Scotia. The certificates take the form of a promise to hand over an amount of gold to the owner of the certificate. No interest is paid, and the owner may be asked to pay storage costs for his bullion.

The main attraction of the various bullion purchase schemes currently in operation is to the investor who wishes to protect himself against a flight from currency without incurring the risks attached to buying gold still in the ground. The system has the disadvantage that while the investor in bullion waits for an increase in gold price, his investment is costing him an annual amount equal to the interest or dividends he is forgoing, plus any storage charges. An investment in a sound gold share with a spread, on the other hand, carries only a marginally greater risk while paying for its keep, and the benefits of the increase would be multiplied to a greater or lesser extent depending on such factors as the cost level and payability of the underlying mines.

MOUNT ISA'S RAILWAY: REASONS FOR WORLD BANK REFUSAL

Australia's Prime Minister, Mr. Menzies, has explained the circumstances leading to the failure of a bid to secure a loan from the World Bank to reconstruct the Mt. Isa-Townsville railway in Queensland. (Development of the 600-mile railway is essential before production of copper, zinc and silver can be fully expanded at the Mt. Isa mines.)

Mr. Menzies said the loan was available and the president of the World Bank, Eugene Black, was enthusiastic; but under the Bank's charter it was necessary to insist on guarantees. The Mt. Isa Mining Co. was required to guarantee enough freight earnings to repay the cost of the project over 20 years. The negotiations broke down as the company refused to do this.

More from Government G.M.A.—The directors of Government Gold Mining Areas have declared a further return of capital of 9d. per share, payable on October 1 to shareholders registered on September 30. It will be remembered that returns of capital from this company are governed by a portmanteau resolution passed last January reducing the par value of the shares from 4s. to 3d. So far 1s. 3d. has been returned, leaving a balance of 2s. 6d. The directors repeat their warning that there is no warranty that this balance will be returned in full.

RAND, KLERKSDORP AND O.F.S. GOLD AND URANIUM PRODUCERS

Comparison and analysis of results for the first six months of 1959 and 1958

Heading		*Jan. to June*	*Rand Cos.*	*Klerksdorp Cos.*	*O.F.S. Cos.*	*Total*
Tons milled :	Millions	1959	24·9	3·6	6·1	34·6
		1958	24·1	3·1	5·0	32·2
Ounces produced :	Millions	1959	5·5	1·4	2·6	9·5
		1958	5·4	1·2	2·0	8·6
Grade per ton :	Dwt.	1959	4·4	8·1	8·5	5·5
		1958	4·2	7·8	8·2	5·2
Working costs per ton :	s. d.	1959	40/0	57/4	59/11	45/3
		1958	43/8	54/0	59/8	46/6
Working profits :	Gold £m.	1959	18·2	7·8	14·1	40·1
		1958	11·8	6·8	10·6	29·2
Working profits :	Uranium and Acid £m.	1959	5·0	5·7	3·6	14·3
		1958	9·7	5·6	3·0	18·3
	Total £m.	1959	23·2	13·5	17·7	54·4
		1958	21·5	12·4	13·6	47·5
Dividends declared :	£m.	1959	8·5	5·5	7·5	21·5
		1958	9·1	5·0	6·1	20·2
Non-Europeans at end June :		1959	258,000	50,000	76,000	384,000
		1958	236,000	39,000	60,000	335,000
Number of Cos. included :		1959	38	7	10	55
		1958	37	7	10	54

Footnote :
When comparing the Working costs and Working profit figures, it should be noted that from 1/1/1959 Uranium mining and milling costs are no longer included under the heading "Working costs" but are charged against Uranium revenue.

COMING EVENTS

An International Congress on Mineral Processing arranged by the Institution of Mining and Metallurgy will be held at Church House, Westminster, London, S.W.1, from Wednesday, April 6, to Saturday, April 9, 1960. Dr. I. W. Wark, chief of the Division of Industrial Chemistry, Commonwealth Scientific and Industrial Research Organization, Melbourne, Australia, has accepted an invitation to deliver the Fifth Sir Julius Wernher Memorial Lecture on the evening preceding the official opening. The papers submitted for discussion at the congress will deal with the following subjects: Comminution; classification; flotation research and practice; gravity and dense medium separation; magnetic and electrical separation; sorting; chemical processing; control and testing; process study; plant operation and layout. Further details may be obtained from The Secretary, the Institution of Mining and Metallurgy, 44 Portland Place, London, W.1 (telephone, Langham 3802).

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Applications for the Proceedings of the Symposium on Shaft Sinking and Tunnelling (price: £3 per copy, plus 2s. for packing and postage), should be addressed to The Secretary, The Institution of Mining Engineers, 3 Grosvenor Crescent, London, S.W.1. It is expected the publication will be early in 1960.

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The Institution of Production Engineers will hold its annual dinner in the Dorchester Hotel, London, on Thursday, November 19, 1959.

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A Symposium on "Hydrometallurgy—wet processing of minerals and industrial products" — is to be held at Adelaide from February 16-19, 1960, by the Adelaide Branch of the Australasian Institute of Mining and Metallurgy.

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The thirteenth annual technical meeting of the Indian Institute of Metals will be held in Bangalore from December 1-5, 1959. The programme will include a symposium on "Structural changes in metals and alloys", being part of the Golden Jubilee celebrations of the Indian Institute of Science, whose director, Dr. S. Bhagavantam, will deliver the 8th Pandya Memorial Lecture.

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The United States Ambassador, Mr. John Hay Whitney, will open the 1959 British Institute of Management National Conference, 1959, which will take place at Harrogate on November 17-19.

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The following dates of forthcoming meetings have been announced:

The South Staffordshire and Warwickshire Institute of Mining Engineers, A.G.M., Lichfield, October 13, 1959, at 3 p.m.

The South Wales Institute of Engineers, A.G.M, Cardiff, October 15, 1959, at 6 p.m.

The Institution of Mining Engineers, A.G.M., London, January 28, 1960; Summer meeting, Cardiff, June 30 and July 1, 1960.

General meetings of The Institution of Mining and Metallurgy will be held on October 15, 1959, November 19, 1959, and December 17, 1959. Meetings in the first months of 1960 will be held on January 21, February 18, March 17, April 21, and May 19.

POWELL DUFFRYN LIMITED

The annual general meeting of Powell Duffryn Limited was held on September 16, in London, **Sir Henry Wilson Smith, K.C.B., K.B.E.** (the Chairman) presiding.

The following is an extract from his circulated statement:

Trading profits in 1958/59, after depreciation but before tax, were £1,513,000, a reduction of £318,000 on the previous year.

The Group's net profit after tax is very much the same as in the year before — £1,076,000 compared with £1,064,000 in 1957/58.

The general background to the fall in trading profits is to be found in the unfavourable conditions which have affected coal and shipping activities throughout the year. Coal and shipping taken together, still account for more than half of Group profits, so that we remain vitally concerned in their state of health.

Group Activities

STEPHENSON CLARKE itself was much affected by the fall in seaborne coal tonnage and especially by the changing pattern of supplies for the electricity and gas industries. A number of our older coal carrying ships have been disposed of and the Company is now equipped with a fleet of the most modern and efficient design.

An event of major interest was the first importation into this country of liquid methane for the Gas Industry, thus implementing plans laid and carried through by that industry in co-operation with American partners. The ship in question, the "Methane Pioneer" is managed and operated, on behalf of its owners by Stephenson Clarke.

ASSOCIATED COAL AND WHARF COMPANIES LIMITED, in which the Group holds a controlling interest, once again had a good year.

The results of the CORY BROTHERS' Companies present a chequered pattern but do include some bright spots. Despite current difficulties, earnings from shipping activities—as agents, charterers and brokers—still produce a useful income. Oil storage activities continue to develop satisfactorily.

The timber interests of the Group have been consolidated under P.D. TIMBER INDUSTRIES LIMITED. A year ago, I said that 1957 was not an easy year for the timber business. 1958 was even more difficult. Yet our home companies importing timber and our overseas Companies exporting timber succeeded in making reasonable profits.

At home J. R. Gordon Limited, aided by a substantial reorganization, has shown definite signs of improvement in its business. On the other hand, its principal investment — the insulation board mill at Queensferry, North Wales —has continued to be disappointing.

That CAMBRIAN WAGON & ENGINEERING COMPANY LIMITED failed to equal its record results of 1957/58 was entirely due to the policy and practice of the British Transport Commission. The repairing of railway wagons, at points other than the Commision's own workshops, have been severely cut and the building of new wagons is almost at a standstill. Faced with the present situation Cambrian has accelerated its non-railway activities and to mark the alteration in the pattern of its trading its name has been changed to "POWELL DUFFRYN ENGINEERING COMPANY LIMITED".

POWELL DUFFRYN CARBON PRODUCTS has had an interesting and encouraging year on the preparatory stages of its programme for machining Nuclear Graphite.

It has received new orders for work in connection with the atomic power programme in addition to the work already entrusted to it by the General Electric Company for the Hunterston Station in Scotland. Since the end of the financial year, these contracts have come into production and will keep the Company occupied well into 1961. This type of work can only be obtained at keen prices, but I am confident that with its modern and efficient machine shop this Company will make a useful contribution to Group results.

WEATHERFOIL HEATING SYSTEMS—pioneers in this country in Warm Air Heating — has, since it became a member of the Powell Duffryn Group some years ago, greatly widened its activities.

POWELL DUFFRYN TECHNICAL SERVICES LIMITED has maintained its high reputation both in this country and overseas.

It is the only British organization of its kind capable of giving a wide range of consultancy services on coal and metal mining and their ancillary services. The annual expenditure on mining developments of all kinds in the Free World runs into hundreds of millions of £ sterling, but unfortunately the under-developed countries, where our services are most likely to find employment, are short of money and a number of major projects in which we should almost certainly find employment are held up for this reason.

At the moment the most important long-term project in which Powell Duffryn Technical Services is engaged is at Neyveli, Madras, where a team on the site, supported by London Office, is now acting as consultants to the Neyveli Lignite Corporation on a large-scale opencast mining operation. It is the basis of an integrated scheme, involving the Authorities concerned in a total capital cost of about £50,000,000, for the production of electric power, fertilizers, and briquettes, which will be of immense importance to the industrial development of South India. The mining project involves the removal of 21,000,000 cu. yds. of overburden before mining, at the rate of 3,500,000 tons per annum, can start. In addition some 70,000,000 gals. of water per day will have to be pumped to make mining possible.

In this country, the Company's Industrial Engineering Department has been engaged as consultants in a number of important industrial projects involving heavy electrical engineering, steam plant, and heating and ventilating services.

The development and expansion of activities which are appropriate both to us as a Group and to the unfolding pattern of industrial and commercial progress remains the main plank of your Board's policy and is well within our compass.

The report and accounts were adopted.

FIELD ENGINEER

Field Engineer required by important mining concern in Ghana. Previous experience in prospecting for lead and alluvial minerals essential. 15 month tours followed by 3 months leave. Salary in accordance with experience and qualifications. Please write giving essential details to Box No. 641, *The Mining Journal Ltd.*, 15 Wilson Street, Moorgate, London, E.C.2.

ADVERTISING MANAGER, declared redundant in recent "take-over" shuffle, seeks new post.

HERE ARE SOME FACTS ABOUT MYSELF:—Age 53, M.A.A., M.I.A.M.A., A.I.P.A. (1937 vintage). Sound advertising agency background. Past twenty-five years spent in technical and industrial advertising (two companies). Seasoned advertising executive accustomed to working harmoniously with all departments. Good organizer with exceptional ability at strict budgetary control. First-class experience planning and executing press campaigns in United Kingdom and Overseas. Creative writer and layout man with lots of experience converting dull subjects into lively and effective publicity by way of press, sales literature, direct mail, display and exhibitions, press and public relations, film distribution, photography, and artwork. Knowledgeable and enthusiastic hard-worker. Highest references available. Salary, about £2,000 but subject to negotiation.

Box No. 642, *The Mining Journal Ltd.*, 15 Wilson Street, Moorgate, London, E.C.2.

For Sale — One High Vacuum, High Frequency Melting Furnace, 30 kW. Unit has two Furnaces, one for Air Melting, the other for Ultra-High Vacuum melting. The Air Melting Furnace is a High Frequency Tilting Unit and will melt approx. 35 lb. Steel in 30 min. The High Vacuum Furnace has 15 in. Diffuser Pump, Backing Pump and will melt approx. 35 lb. Steel in 30 min. and will give Ultra-High Vacuum. The High Frequency Generator is a 30 kW. Metro-Vickers valve oscillator at approx. 200 kc. Equipment almost new, manufactured in 1952. Unit is ideal for experimental work or small production runs and is complete with Starters, Pumps, Control cubicles and Pipe Works, etc. Further details available on request. *Price* £1,250.

Davidsons Engineers (M/cr) Ltd., Irkdale Street, Smedley Road, Cheetham Hill, Manchester 8, Telephone No. COLlyhurst 1610.

Publications Received

The Lead Development Association, 18 Adam Street, London, W.C.2, has reprinted its 4-page brochure, *Simple Notes on Lead and its Uses*, which for over four years has been in steady demand from students not requiring an extensive or detailed knowledge of the mining, smelting and refining of lead, and who seek a brief account of its manifold uses. The opportunity has been taken to rewrite most of the text and to bring the factual information up to date.

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Plant for the Steel Industry is the subject of an illustrated brochure produced by Head Wrightson and Co., Ltd., in four languages — English, French, German and Spanish. Its purpose is to present a brief account of the extent of the operations of the Head Wrightson organization in the field of iron and steelworks engineering.

The Head Wrightson Research and Development Department is a central organization serving all the subsidiary companies. Its five main sections are: Head Transfer and Fluid Flow; Physical Metallurgy; Extraction Metallurgy; Engineering Research; and Development. The Extraction Metallurgy section undertakes large scale site tests of metallurgical and mineral dressing plants made by Head Wrightson. At the same time laboratory facilities are available for pelletizing and sintering, for particle size determination, and for mineral dressing.

Head Wrightson Iron and Steel Works Engineering Ltd., can undertake the complete engineering of iron and steelworks development projects covering ore handling and preparation, sintering, iron making, gas cleaning and steel making. Additionally, it is able to supply individual items of specialist equipment. The company is engaged at the present time on two internationally famous projects at Aviles in Spain and at Durgapur in India. Head Wrightson's interest in the Spanish plant covers the supply of the ore handling, sintering, blast furnace and gas cleaning plant. At Durgapur, where the first of the three blast furnaces is now almost complete, they are responsible for all the iron making plant and ancilleary equipment including the materials handling plant.

Examples of plant built by Head Wrightson are illustrated in a companion brochure, *Engineering for World Industry*. They include the Manvers Main coal preparation plant at Mexborough, Yorkshire, producing 1,320 tons of coal, the largest plant of its kind in Europe; South Kirkby coal preparation plant; and a continuous centrifuge with a capacity of 50-80 tons of coal per hour. All these were designed and supplied by Head Wrightson Colliery Engineering.

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The European Congress on Ground Movement was held at Leeds University in 1957. It was sponsored by the University of Leeds and the National Coal Board and was supported by the Royal Institution of Chartered Surveyors and the Institution of Mining Engineers. The aim was to exchange information on the problem of ground subsidence in the winning of stratified deposits, principally coal deposits.

Twenty-three papers were presented by experts from Britain, France, Netherlands, East and West Germany, Austria and Poland. These papers, and the discussions which followed their presentation, are published (in English) in a handsomely bound and illustrated volume entitled *Proceedings of the European Congress on Ground Movement* (218 pages).

The papers, regarded as a whole, are the most up-to-date and complete account of the findings of experts from several countries. They deal with surface movements, underground movements, laboratory experiments and theory. An interesting feature is the similarity of experience and outlook between investigators working in widely separated coalfields.

Copies, price £2 2s. each, post free, may be purchased directly from the Department of Mining, University of Leeds, Leeds 2.

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Standard Materials Issued by the National Bureau of Standards. Published by United States National Bureau of Standards. Circular 552, price 35 c., lists the standard materials issued by the Bureau and their prices. Information on certified compositions and properties and purchase procedures are given.

The National Bureau of Standards began issuing standard materials in 1905 with the preparation of a small group of metals of certified chemical composition. The programme has grown through the years in response to the demand of science and industry, and now the Bureau supplies more than 550 different standards of metals, ores, ceramics, chemicals, hydrocarbons, and radioactive materials.

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